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THE ELGIN MARBLES. No. II.



FIGURES FROM THE PANATHENAIC FRIEZE.

THE Elgin marbles consist chiefly of metopes, parts of the frieze, and statues from the tympana and pediments of the Parthenon, or temple of Minerva at Athens.

There are fifteen metopes, the subject of which is the battles between the Centaurs and the Lapithæ. The Centaurs are poetical beings, of Thessalian origin, composed of a man and a horse. The natives of Thessaly, being fond of hunting the wild bulls with which their country abounded, acquired the name of *Centaurs*, or bull-goalers; but by degrees, the imagination of poets and sculptors transformed the hunters of Thessaly into fabulous beings with a human head, arms, and trunk, joined to the body and legs of a horse; and this perhaps because the Thessalians first, in those parts of the world, enlisted the horse into the service of man. The quarrel between the Centaurs and the Lapithæ, in the thirteenth century B.C., is said to have arisen from an insult offered by Eurytus the Centaur, to the bride of Pirithous, king of the Lapithæ, at the marriage-feast of the latter. Theseus, the friend of the king, resented the insult by throwing a large vessel full of wine at the head of the offending Centaur, which killed him. The quarrel then became general: an engagement was maintained

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with equal fury on both sides; but the Lapithæ finally remained victors. This contest is represented in the metopes of the Elgin collection: each metope contains two figures grouped in various attitudes: in some, the Lapithæ are victorious, and in others the Centaurs. The figure of one of the Lapithæ, lying dead and trampled upon by a Centaur, is one of the noblest productions of sculpture: another, equally remarkable, is that which represents the Centaur Eurytion attempting to carry off Hippodamia the bride: the furious galloping of the Centaur, and his shrinking from the spear hurled after him, are expressed with wonderful effect. All these metopes are in high relief; and the groups are finished with the minutest attention in every part, even in those parts which were not intended to meet the eye. They formed originally ninety-two groups, and were continued round the entablature of the Parthenon.

The frieze which was carried along the outer walls of the cella, offered a continued series of sculptures in low relief of the most exquisite beauty. The subject of this frieze is the Panathenæa, an Athenian festival in honour of Minerva, the protectress of Athens. It was first instituted by Erichthonius, and afterwards revived by Theseus, when all the Athenian people

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were united into one city. At its first institution it was continued during one day only; but was afterwards prolonged for several days, and celebrated with great splendour.

There were two solemnities called *Panathenæa*; one was the GREAT *Panathenæa*, forming the subject of the above-mentioned frieze, and celebrated once in five years; the other was called the LESS *Panathenæa*, and was observed more frequently. We will first speak of the ceremonies of the latter festival, because they were repeated with greater splendour and magnificence in the former.*

In the Less *Panathenæa* were three games, managed by ten presidents, who were chosen from the ten tribes of Athens, and who remained in office for four years. On the first day, was a race with torches, contested by both horse and foot-men. The second contest, was a gymnastic exercise for the combatants to display their strength and manhood. The third was a musical contest, instituted by Pericles, about 440 B.C., in which patriotic subjects were proposed, such as the eulogium of Thrasybulus, who, some years after, rescued the republic from the tyrants' yoke. There was also a contest of the poets in four plays. In addition to these, was a contention, in imitation of a sea-fight; the Athenian state being for a long time mistress of the Grecian seas. The victor in any one of these games was rewarded with a vessel of oil, and a crown of olives which grew in the Academy; which was a shady grove near Athens, devoted to learning and study. There was also a dance performed by boys in armour, to the sound of the flute, representing the battle of Minerva with the Titans. No man was allowed to be present at these games in dyed garments, under a penalty, to be imposed by the president of the games. Lastly, a sumptuous sacrifice was offered, to which every Athenian borough contributed an ox; and of the flesh which remained, a public entertainment was made for the whole assembly; and at this entertainment very large drinking-cups were used.

At the Greater festival, in addition to the above rites and ceremonies enacted on a more splendid scale, there was a procession, in which was carried the sacred garment of Minerva. This procession forms the immediate subject of the *Panathenæa* frieze. The sacred garment was worn by a select number of virgins, under the superintendence of two virgins with white garments set off with gold. The sacred garment was also white, without sleeves, and embroidered with gold: upon it were described the achievements of Minerva against the giants; of Jupiter; of the heroes; and of men renowned for valour and high exploits; and hence it was considered to be the highest compliment that could be bestowed on a brave man, to declare him worthy of a place on the garment of Minerva. The following were the ceremonies attending the procession:—in the *Ceramicus*, which was a place without the city, for the burial of those who died in defence of their country, was an engine built in the form of a ship, upon which the sacred garment was hung in the manner of a sail; this engine was moved by concealed machinery, and was thus conveyed to the temple of Ceres Eleusinia, and thence to the citadel, where the garment was hung upon Minerva's statue, which was placed on a bed strewn with flowers. This procession was composed of a great concourse of people of both sexes, and of all ages and ranks. It was led by aged persons bearing olive-branches. After these came middle-aged men, armed with warlike weapons, and

accompanied by the sojourners carrying little boats, as emblems of their being foreigners. Then followed the women, attended by the sojourners' wives, carrying water-pots, in token of servitude. These were followed by young men crowned with millet, who sang hymns in honour of the goddess. Next came select virgins of high rank, carrying baskets which contained sacred utensils, cakes, and the necessary articles of sacrifice. Then followed the sojourners' daughters, carrying umbrellas and folding-chairs. The rear was brought up by boys in peculiar coats used at processions.

At this solemnity, (says Robinson), it was usual to have a gaol-delivery, to present golden crowns to those who had rendered any remarkable service to the commonwealth, and to appoint rhapsodists to sing the poems of Homer. Lastly, in the sacrifices at this and other quinquennial solemnities, it was customary to pray for the Plateans, on account of the services they had rendered to the Athenians at the battle of Marathon, in which they behaved with extraordinary courage and resolution.

This battle took place, Sept. 28, 490 B.C.

Such is the busy scene which Phidias undertook to perpetuate in marble. The procession was represented as moving in two parallel columns, from west to east; one along the northern, and the other along the southern side of the temple, and after turning the two angles of the eastern front, they met at its centre. This seems to have been the most wonderful and extensive piece of sculpture ever executed in Greece. It consists of blocks of marble, three feet four inches high, and the figures represent gods, heroes, priests, basket-bearers, and bearers of libatory vessels, men, women, and children, horses, chariots, and victims; all moving in solemn procession.

It appears from the united opinions of those who are well qualified to judge, that the execution of this frieze is beyond all praise. The effect of the whole is life, animation, and activity: the costumes are very various, and the execution of the drapery is peculiarly fine. Some of the figures are completely clothed; others have naked feet; and others wear boots of different kinds: the heads of some are uncovered; others wear helmets and hats. An increased effect is added to the composition by "an apparent crowding and confusion, a variety of attitude, of dress and preparation, of precipitancy and care, of busy movement and relaxed effort, whereby," as Dodwell observes, "an animated reality is diffused throughout the subject, adding interest to every figure, and epic grandeur to the whole."

Of the horses, of which there are one hundred and ten, and no two in the same attitude, Flaxman thus speaks:—

They appear to live and move, to roll their eyes, to gallop, prance, and curvet; the veins of their faces and legs seem distended with circulation; in them are distinguished the hardness and decision of bony forms, from the elasticity of tendon and the softness of flesh. The beholder is charmed with the deer-like lightness and elegance of their make; and although the relief is not above an inch from the background, and they are so much smaller than nature, we can scarcely suffer reason to persuade us they are not alive.

Of this frieze, there is in the British Museum, in slabs and fragments of marble, an extent of about 249 feet; and of plaster-casts about 76 feet taken from the original slabs, which were not brought away: there is also a cast of the slab, which is in the Louvre gallery at Paris.

THE duty of the good man consists not only in forgiving, but even in a desire of benefiting his destroyer; as the sandal-tree, in the instant of its overthrow, sheds perfume on the axe that fells it.

* Our authority for the mythic details of this article is chiefly ARCHBISHOP POTTER'S valuable work on the *Antiquities of Greece*.

ON SKILLED LABOUR.

IV.

WE have pointed to procuring good apprenticeships in one or other of the many branches of skilled industry, as one of the greatest benefits that labouring parents can procure for their children; we have given some hints with respect to the means of accomplishing this often difficult object, and we proceed to show how such parents may avail themselves of the principle of co-operation in procuring that command of money, or other means, by which their boys may be apprenticed and maintained until able to maintain themselves.

Here we are met at once by the objection that the inhabitants of a country village must have a certain degree of confidence in themselves, in each other, and in Providence, before they can effectually join in any plan in which the failure of one to do his part, may derange and damage the whole. We are just come in from crossing a common, in company with a letter-press printer, who has had experience both of a London life and of one in the country, who greatly prefers the latter, who has ample facilities for joining with his neighbours in a common plan by which advantage might be taken of a cheap and easy transmission of garden and dairy produce to the London markets, and whose reply, on our suggesting such a plan to him, was at once this—that the parties could not trust each other.

Perhaps they cannot trust themselves. There are men whom an early familiarity with the alehouse, the Sunday newspaper, and the tobacco-pipe, has seduced into habits too strong for them to break, which separate them from their wives during those hours of cessation from toil, when they might be planning and executing, with their partners in weal and woe, schemes for their mutual advantage, and for the benefit of their little ones, and which totally unfit them for any course of steady and strenuous endeavour of which the reward is placed in a distant future. It is quite as natural for the slaves of such habits to laugh at the plans we are about to describe, as it was for those who have actually executed them, (for we describe what we have seen,) first to purpose calmly and firmly, and then steadily to effect what they have thus purposed; never deterred by any obstacles and hindrances, because never doubting that no obstacle or hindrance can reverse God's promises, or that God will ultimately bless a parent's prayerful endeavours, though it may not be at the time or in the manner they may expect.

The slaves of low habits never certainly can be safely trusted by others, since they cannot trust themselves. And thus we find ourselves thrown back at every step, on the great principles with which we started; namely that "the fear of God is the beginning of wisdom," and that amid all the individual cases in which Providence permits wickedness to thrive in this world, still, as a general fact, the temporal welfare of men, families, communities, and kingdoms, rests on very much the same foundations with the Christian character as described in Holy Writ—on faith, virtue, temperance, patience, godliness, brotherliness, and charity. Indeed, where these qualities abound, they diffuse their happy effects on persons who do not themselves really possess them. Example and habit influence these, and thus sobriety, prudence, and intelligence, become the virtues of a whole neighbourhood. The population of the place I refer to is variously composed. Some are common labourers, some hand-loom weavers, often earning less by the loom, than the labourer with his spade and mattock;

others are country tailors, shoemakers, &c. Yet they almost all take part in the system about to be described, and in so far as we could observe, all were more or less benefited by it, excepting some, who had made what we call their *extra-professional* an excuse for neglecting their *regular* employments, and having gradually become speculators in bargains, had acquired a taste for settling those bargains over strong drink. Such persons, I have no doubt, would, under any circumstances, have become busy-bodies and tipplers, but in the instance before us, by gradually losing character, they gradually lost with it the advantage of co-operation with others, by simply ceasing to be trusted.

The spot I allude to was too distant from any considerable market to admit of market-garden stuffs being profitable. But it was not so for butter, eggs, fowls, and bacon; and to the producing of these and a little lint each family seemed to confine itself.

The proprietors of the adjoining estates offered nothing whatever in the shape of bounties—no allotments, either gratis, or at reduced rents, but, on the contrary, the land, from excessive competition, appeared to us to be in many instances let too high. Yet the sober and industrious almost uniformly thrive, and the place has sent out not a few youths who have risen from comparative poverty to handsome incomes, in the places of their ultimate destination. One such youth, dying childless, after realising a large fortune in one of our colonies, left a part of it to his native parish for educational purposes, and the results are one flourishing classical academy and three or four district schools, so that there is not perhaps a parish in Britain so well provided for in that respect.

The families who keep cows feed them from three or four distinct sources. Attached to their houses, each generally has a small garden; in addition to that, they have often, on a lease of from five to twelve years, a patch of ground, which they cultivate with the spade, to which they carry, in wheel-barrows, the manure of their pig-sties and cow-houses, and from which they derive a considerable part of the winter and spring food of their cows, and a little corn. They are bound by their landlords to cultivate these spots, however small, in such a manner that the soil shall never be exhausted.

As the parish has no common, and indeed no ordinary common would suffice for all the cows, this difficulty is met by a very simple plan, in which the co-operation we refer to is indispensable. The neighbouring proprietors, from a regard partly for beauty, partly for interest, keep fields and meadows of various sizes in pasture, and let them for the season, in spring, by public auction, with an obligation not to over-pasture them, either by admitting an excessive number of animals, or by allowing them to remain too long after the close of the season. We shall suppose a field of ten acres is put up. The bidders are so many knots of the inhabitants, who design it for their cows. One company, as they are called, authorizes their spokesman to bid so much, another so much more, until at length it is knocked down to the highest bidder. When the auction is over, the parties give bills, or promissory notes, binding themselves, jointly and severally, to pay the rent at which the fields were respectively knocked down to them at the close of the season—say at Christmas; and then they agree among themselves as to the pasturing of their cows.

But it may be said, among poor people, how can there be so much mutual confidence? What should

one of a company lose his cow—who then is to pay his proportion of the rent? This is met either by loans, made up among his friends and neighbours, or by the parties assuring each other against such losses. Thus, ten of a company may each, by contributing a guinea, provide a fund sufficient to replace one out of ten cows dying, with a ten-guinea cow.

Co-operation is required, also, in disposing of produce. At the place I refer to, the carts which bring out the cotton and silk yarns, and take back the webs, form a carrying system, which includes the transport of produce from country to town, and the reverse. Carts, in fact, go from house to house over night, or at a very early hour, collecting butter, eggs, fowls, &c., for market, and return with sugar, tea, and various articles, to be purchased to advantage only in large towns.

Thus we have a system that has stood the test of many long years, and which produces more positive good than all the fine theories of your philosophers. I need not say that the men and women who form it are old-fashioned Christians and good subjects—not either Owenites or chartists.

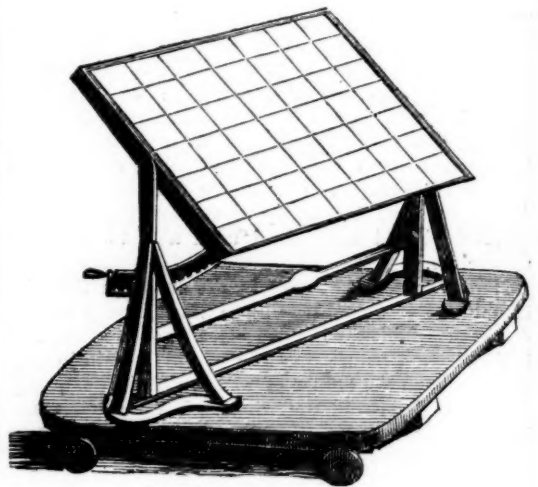
As it may be surmised that labourers and artisans, who thus involve themselves in keeping cows and so forth, cannot possibly do justice to their employers, we may add that no such objections exist on the spot. Nay, to judge by one, and that the most numerous class, the hand-loom weavers, we must infer the very reverse, as the following fact will show. In the winter of 1825-6, that branch of industry was particularly depressed, so much so that hardly a single loom was employed in the place; but such was the high repute of its cotton weavers for careful execution of their orders and honesty, that silk yarns were sent out to them in the spring of 1826, first cautiously, and by way of experiment, but soon after regularly, and to a large amount, in consequence of the success of the experiment.

We dare not say that the inhabitants are exempt from many defects. We believe that they would not themselves have originated the system of frugal industry, which they inherit from forefathers who were, according to their own confessions, much their superiors, both in religious knowledge and in practical christianity. During the high prices that were paid for weaving, from the end of the last century down to the close of the war, many of the inhabitants grew giddy from sudden wealth. Some became speculators, and were made reckless by the failure of their schemes; others fell into drinking habits, retaining the form of godliness without its power. We hope that, as a body, they are improving; but our present purpose in introducing them into these pages is to produce a practical illustration, the permanent result of long experience, not the forced and solitary fruit of some philanthropic project of yesterday—to which we can point in proof of the extent of resources which Divine Providence has placed within the reach of poor labouring families, in our rural districts, who desire to give their sons a skilled education, but are deterred, and thrown back in despair, because they think the means utterly beyond their attainment. H.

Sorrows like showers descend, and as the heart
For them prepares, they good or ill impart;
Some on the mind, as on the ocean rain,
Fall and disturb, but soon are lost again;
Some, as to fertile lands, a boon bestow,
And seeds, that also had perished, live and grow;
Some fall on barren soil, and thence proceed
The idle blossom, and the useless weed.—CRABBE.

ON BURNING GLASSES.

I.



BUFFON'S BURNING MIRRORS.

WERE we not to pay close attention to the principles by which the phenomena are produced, few things would appear more strange than the apparent production of fire, by means of what are called *burning glasses*, or *burning instruments*. If we remove the object glass from a telescope, or an opera glass, and hold it up between the sun and the hand, a little adjustment will enable the sun's rays to pass through the glass in such a manner as to produce an insupportable degree of heat: this property, as well as a somewhat similar one, arising from solar rays reflected from a concave surface, have given rise to the production of many remarkable burning instruments, which are well worthy of our notice.

In order to produce such an effect by means of a transparent lens, through which the solar rays may pass, it is necessary that one or both surfaces of the lens be *convex*. The effect of a convex lens is, that those rays of light which were parallel before they fall upon the lens, are made to *converge* on leaving the lens, that is, they are all gradually collected into one point. The effect of this is, that all the light forming the millions of rays which enter the glass is congregated in one little space, and produces an intense illumination. But this is not all. We do not know the real nature of solar light, but we know that *heat* is always combined with it; and whenever the luminous effect of rays of light is congregated or focalized in one spot, the heating effects are so likewise. We therefore find that whatever arrangement will concentrate solar rays into one spot, will at the same time concentrate the solar heat. We need not here speak of the refined experiments by which the heating rays are separable from the luminous rays, for in all common experiments they are combined.

Now there are two ways in which solar rays can be converged to a focus; first, by reflexion from a concave surface; second, by transmission through a convex surface: in the first case, the reflecting body is opaque, with one of its surfaces concave, and highly polished: in the other case, the transmitting body is transparent, like glass, for instance, with one or both of its surfaces convex. If the reflecting body be convex, or the transmitting body concave, the rays of light would diverge instead of converge. The effect of focalization of light, under the circumstances which we have detailed, depends on two optical laws, viz., that when rays of light are reflected from a polished surface, the

angle of reflexion is just equal to the angle of incidence; and that when light passes out of a rare medium, such as air, into a denser medium, such as glass, the rays are deflected, or refracted out of the straight line. By a certain adjustment of distances, these two laws may be made available for the production of heat by focalizing the solar rays. This truth has been known for centuries; and we proceed to describe the contrivances resulting from it. We shall first speak of the burning instruments which act by *reflexion*, and afterwards of those acting by *transmission*.

It has been a point subjected to no little discussion, as to what degree of credence ought to be given to the story of the exploits of Archimedes. We will take the account of Tzetzes, which says:—"When the fleet of Marcellus was within bow-shot, the old man, Archimedes, brought out a hexagonal mirror which he had made. He placed, at proper distances from this mirror, other smaller mirrors, which were of the same kind, and which were moved by means of their hinges, and certain square plates of metal. He afterwards placed his mirror in the midst of the solar rays, precisely at noon day. The rays of the sun being reflected by this mirror, he kindled a dreadful fire in the ships, which were reduced to ashes, at a distance equal to that of a bow-shot." This passage relates to the burning of a Roman fleet, which was besieging the city where Archimedes was. The marvellous results detailed have induced many commentators to think that the whole affair should be ranked among the fables of antiquity; but Sir David Brewster (*Edinburgh Cyclopædia*), considers, that if we suppose Archimedes to have employed a combination of plain mirrors, and if we make some allowance for the exaggeration of ancient authors, there seems reason to believe that some such effect as that described was within the bounds of probability. Six or seven of the Latin authors contain descriptions, more or less full, of this exploit, and although we can easily suspect them of exaggeration, yet it is not likely that the whole affair is falsely reported.

We will now pass from Archimedes to Anthemius, an architect in the employ of the Emperor Justinian. This ingenious man wrote a treatise on machines and mechanical contrivances, in which he details the mode by which he conceives a powerful burning apparatus may be constructed. He directs that a hexagonal plane-mirror may be taken, and around this other hexagonal mirrors are to be placed, not in the same plane as the first, but inclined to it. The rows of mirrors, as they recede from the central one, are to be inclined more and more from it, and every mirror is to be joined edgewise to those around it: the effect of this he says would be, that all the light reflected from all the mirrors, would be focalized at one spot. He seems, in fact, to have well understood the properties of a parabolic reflector, for such appears to have been the form of the instrument described. The difference between such a reflector, and the parabolic reflector of our own day is, that in the latter the reflecting surface is one continuous curve, while in the former it was a curve made up of a number of little planes.

Mechanical contrivances met with very little encouragement during the dark ages of European history; but about two or three centuries ago attention seems to have been again directed to the construction of burning instruments. Leonald Digges, in 1571, published a work, called *Pantometria*, in which, after speaking of the exploits of Archimedes, he says:—"Some have fondly imagined that Archimedes burned the Roman navie with a portion of a section parabo-

lical, artificialye made to reflect, and unite the sunne beames a great distance off; and for the construction of this glass toke great peines, with high curiositie, to write large and many intricate demonstrations; but it is a mere fantasie, and utterlie impossible, with any one glass, whatsoever it be, to fire anything only one thousand pace off, no, though it were an hundred foot ouer, marry true it is the parabola, for his small distance most perfectly doth unite beames, and most vehemently burneth of all other reflecting glasses." He expresses an opinion, however, that by a combination of several glasses into a parabolic form, the effect might be produced.

A few years after this publication Baron Napier, of Merchiston, gave an indistinct intimation of a burning glass which he had devised, but not sufficiently explicit to let us know the nature of it.

The next author who we have to name is Kircher, a man of an indefatigable turn of mind in the pursuit of science. He was led to an investigation of the properties of burning glasses, by a wish to determine the probable truth of the prevalent story concerning Archimedes. He performed many experiments: first, he combined a number of parabolic reflectors; then he arranged a number of flat circular mirrors against a wall, inclined at such angles to one another, that the reflected rays from all were combined in one spot: and afterwards, he made numerous experiments with five plane reflectors, fixed in a frame, and so inclined as to focalize the reflected rays at the distance of a hundred feet: he tested the heat produced by one, two, three, four, and five mirrors successively, and noted their comparative effects: he even went to Syracuse, to endeavour to determine the position and distance of the Roman fleet, with respect to Archimedes' burning apparatus.

During the seventeenth century, M. Vilette, a French artist at Lyons, constructed several large burning mirrors. These mirrors seem to have differed considerably from those before alluded to, for each mirror consisted of a single concave surface. They were made of a composition, of which copper and tin were two of the ingredients, and the reflexion had something of a yellow cast. One of these mirrors was as large as forty-seven inches in diameter, with a focal length of thirty-eight inches. One of them was exhibited before the king of France, in 1670, at St. Germain, and the results of the experiments were very remarkable.

A small piece of pot-iron was melted in	40 seconds.
A silver piece of fifteen pence was pierced in	24 "
A thick nail was melted in	30 "
The end of a sword blade burnt in	43 "
A brass counter was pierced in	6 "
A piece of red copper was melted in	42 "
A piece of chamber quarry-stone vitrified in	45 "
Watch-spring steel melted in	9 "
A mineral stone calcined and vitrified in	1 "
Green wood and other bodies took fire instantly.	

Another mirror melted a small silver coin in seven seconds and a half, and various other metals in times varying from three to thirty seconds.

In 1685 M. de la Garouste presented to the Academy of Sciences a polished reflector of five feet in diameter. This instrument was said to produce very powerful effects, but the nature of it has not been detailed.

The next instrument we have to describe, was constructed by Tschirnhausen, and was of well polished copper, nearly five feet in diameter. Among the effects produced by it, were the following:—A piece of wood, held in the focus, flamed instantly; water, applied in an earthen vessel, boiled immediately: a piece of tin, three inches thick, melted in drops as

soon as it was put in the focus: a plate of iron or steel became instantly red-hot, and a hole was soon afterwards burned through it: copper and silver melted in five or six minutes: slate, tile, pumice, crucible, and bone, were speedily converted into a kind of enamel, differing in opacity and in colour.

The greatest improver of these contrivances was the celebrated Buffon, who made very diversified experiments on the best mode of focalizing heat. He found that silvered glass reflected light more powerfully than polished metals; and he investigated the extent to which the heat is dispersed by passing through the air. When he had made many preliminary experiments, he proceeded to construct the burning apparatus represented in our cut. He took a great number (at first 168,) of pieces of silvered glass, six inches by eight, and mounted them in an iron frame, each glass being so fitted up with screws and springs that a motion could be given to it in any direction, so that the image reflected from all the plates might be easily thrown upon the same spot; and the whole frame, by means of the toothed arm seen below it, could be placed at an angle depending on the sun's altitude. The peculiarity of this mirror consisted in the long distance to which its effects extended: in most of the instances already detailed the focus was only four or five feet from the mirror, but Buffon's experiments will show how far otherwise it was with his apparatus.

March 23, 1747.—Buffon set on fire, at a distance of 66 feet, a plank of tarred beech wood, with 40 mirrors only, although the machine happened to be disadvantageously placed. On the same day a tarred plank was set on fire, at a distance of 126 feet, with 98 mirrors. April 3.—By a pale evening sun a slight inflammation was produced upon a plank covered with wool cut into small pieces, at the distance of 138 feet, with 112 mirrors. April 4.—When the sun was rather obscure, 154 mirrors, at the distance of 150 feet, made a tarred plank smoke profusely in two minutes. April 5.—154 mirrors, at a distance of 250 feet inflamed chips of fir deal, sulphured and mixed with charcoal: when the sun was bright, the inflammation took place in a few seconds. April 10.—128 mirrors, at a distance of 150 feet, set fire to a tarred plank of fir. April 11.—12 mirrors at the distance of 20 feet inflamed small combustible matters: 21 mirrors inflamed a plank of beech: 45 mirrors melted a large pewter flask, weighing about six pounds: 117 mirrors melted some thin pieces of silver, and made a piece of sheet-iron red-hot: the distance of 20 feet was maintained throughout these four experiments.

The result of Buffon's experiments led him to believe that he could melt metals as easily at 50 feet distance as at 20. He also considered that a distance of about 40 or 45 feet was the most advantageous for experimenting on the metals. In subsequent experiments Buffon ignited wood at a distance of 200, and even 210 feet, when the sun was shining brilliantly; and he melted nearly all the metals and metallic minerals at a distance varying from 25 to 40 feet. The apparatus required about half an hour to bring all the mirrors to focalize in one spot.

In another paper we shall speak of some subsequent contrivances by Buffon, and also of some made in later times; after which we shall speak of those which act by the transmission, instead of the reflexion, of solar rays.

Be moderate in thy desires of what thou hast not; and moderate in the use of what thou hast.—BISHOP PATRICK.

TO GOD.

For thee, for thee, my lyre I string,
Who, by ten thousand worlds attended,
Holdest thy course sublime and splendid
Through heaven's immeasurable ring;
I tremble 'neath thy blazing throne,
Thy light eternal built upon,—
Thy throne, as Thou, all radiant, bearing
Love's day-beams of benignity!
Yet terrible is thine appearing
To them who fear not thee.

O what is mortal man, that he
May hear thy heavenly temple ringing,
With songs that heaven's own choirs are singing,
And echo back the melody?
My soul is wandering from its place;
Mine eyes are lost amidst the space
Where thousand suns are rolled through heaven,—
Suns waked by Thee from chaos' sleep;
But with the thought my soul is driven
Down to a trackless deep.

There was a moment ere Thy plan
Poured out Time's stream of mortal glory;
Ere Thy high wisdom tracked the story
Of all the years since time began,
Bringing sweet peace from sorrow's mine,
And making misery discipline;
The bitter waters of affliction
Distilling into dews of peace,
And kindling heavenly benediction
From earth's severe distress.

Then did thine Omnipresent eye,
Earth's million million wonders seeing,
Track through the misty maze of being
E'en my obscurest destiny.
I, in those marvellous plans, though yet
Unborn, had mine own portion set,
And Thou hadst marked my path, though lowly;
E'en to my meanness Thou didst give
Thy spirit—Thou—so high—so holy
And I, thy creature, live.

So, through this trembling ball of clay,
Thou to and fro dost kindly lead me;
Midst life's vicissitudes I speed me,
And quiet peace attends my way.
And, O, what bliss it is to be,
Though but an atom, formed by Thee;
By Thee, who, in thy mercy, pourest
Rivers of grace, to whom, indeed,
The eternal oak-trees of the forest,
Are as the mustard seed.

Up, then, my spirit! soar above
This vale where mists of darkness gather,
Up to the high eternal Father,
For thou wert fashioned by his love.
Up to the heavens! away! away!
No! bend thee down to dust and clay;
Heaven's dazzling light will blind and burn thee;
Thou canst not bear the awful blaze.
No! wouldst thou find the Godhead, turn thee
On nature's face to gaze.

There, in its every feature, thou
Mayest read the Almighty; every feature
That's spread upon the face of nature
Is brightened with His holy glow;
The rushing of the waterfall,
The deep green valley,—silent all;
The waving grain, the roaring ocean,
The woodland's wandering melody,
All—all that wakes the soul's emotion,
Creator! speaks of Thee.

But of thy works through sea and land,
Or the wide fields of ether wending,
In man Thy noblest thoughts are blending;
Man is the glory of thy hand!
Man, modelled in a form of grace,
Where every beauty has its place;
A gentleness and glory sharing
His spirit, where we may behold
A higher aim, a noble daring,—
'Tis thine immortal mould.

O wisdom! O unbounded might!
 I lose me in the light Elysian;
 Mine eye is dark, and dimmed my vision:
 Who am I in this gloomy night?
 Eternal Being! let the ray
 Of thy high wisdom, bear away
 My thoughts to thine abode sublimest;
 But how shall grovelling passions rise
 To the proud temple where thou climbest,
 The threshold of the skies!

Enough, if I a stammering hymn,
 My God! to Thee, may sing, unworthy
 Of those sweet strains poured out before Thee
 By heavenly hosts of Cherubim.
 Despise me not,—one spark confer,
 Worthy of thy own worshipper;
 And better songs, and worthier praises,
 Shall hallow Thee, when midst the strain
 Of saints, my voice its chorus raises,
 Never to sink again.

[From the Dutch.]

THE COMMON YEW,

(*Taxus baccata*.)

THE common yew is the only tree belonging to the subdivision of coniferous vegetables called *Taxine*, which is a native of Britain. It is generally distributed throughout the northern parts of Europe, and is also a native of North America, and of the Japan isles. It was much more abundant in England and Ireland some centuries ago than it is at the present time. In the latter country great quantities of yew are found imbedded in the earth. We also find, from the mention made of it by Cæsar, that it was very plentiful in Gaul, at the time of his invasion of that country.

The yew is a very slow-growing tree, especially in mountainous situations: it is mostly seen at a distance from other trees, and is rarely found in forests, or even in large groups of trees; for though the baneful properties of the yew have been much exaggerated, it is still true that other trees do not thrive well in its immediate vicinity.

The foliage of the yew is of a peculiarly dark and sombre green, and the branching habit of the tree gives it a breadth and density of shade that well accord with the situation which, in this country, it mostly occupies, i.e. the village churchyard. The gloomy appearance of the tree seems to have constituted it the emblem of mourning in all nations, and the extremely lasting nature of its timber, as affording a faint type of immortality, was probably the cause of its being planted in churchyards by our forefathers. The leaves of the yew grow very thickly along the twigs in opposite rows, and are of a linear shape; the cones, or berries, are small and numerous, and when ripe the seed is found enclosed in a soft pulp of a bright red colour and very sweet taste. This pulp was formerly supposed to possess most deleterious properties, but has now been proved to be perfectly innocuous; the narcotic principle being confined to the leaves. Instances have been cited of the fatal effects of the chippings from these trees when eaten by horses and cows. It is likewise thought that bee-hives placed near a yew-tree will not prosper.

When this tree occupies a moist and shaded situation in a rich soil, it grows at a quicker rate than its usual habit, but it is not bettered by the change. The timber is neither so heavy nor compact as usual, and very frequently the tree, while increasing in diameter, becomes hollow in the centre, and does not contain more wood than one of a smaller growth, at the same time that the quality of the timber is very

inferior. This tree never attains any great height, but sometimes exhibits in the protuberances of its trunk and branches a very curious appearance. These fantastic forms, as they are sometimes exhibited in nature, are by no means displeasing to the eye, but the barbarous attempts at improvement on nature, formerly so much in fashion, are extremely offensive to a correct taste. The Romans were perhaps the means of introducing this custom among us, for we are told by Pliny that they were fond of cutting their evergreens into the shapes of birds and beasts: however this may be, the custom was prevalent in this country for several centuries, and even now we are too often annoyed by goodly trees of yew, cypress, or box, deformed and deprived of all their natural beauty by the attempt of their owners, to conform them to their own ideas of graceful proportions. Pyramids, obelisks, and various uncouth figures of birds and beasts of yew, still decorate gardens and courtyards in the country, and excite the amusement of the passenger, while in some places we still see vestiges of the tall impenetrable hedges formed of these trees in ancient times, and kept in their stiff wall-like forms by repeated and diligent shearing. Gilpin notices this strange practice. In speaking of the yew, he says:—

As to its picturesque perfections,—I profess myself (contrary, I suppose, to general opinion) a great admirer of its form and foliage. The yew is, of all other trees, the most *tonile*; hence all the indignities it suffers. We everywhere see it cut and metamorphosed into such a variety of deformities, that we are hardly brought to conceive it has a natural shape, or the power which other trees have, of hanging carelessly, or negligently. Yet it has this power in a very eminent degree; and in a state of nature, except in exposed situations, is perhaps one of the most beautiful evergreens we have. Indeed, I know not whether, all things considered, it is not superior to the cedar of Lebanon itself—I mean to such meagre representations of that noble plant as we have in England. The same soil which cramps the cedar is congenial to the yew.

The large use made of the wood of the yew in former days for military purposes, occasioned the supply of native timber to be insufficient; great quantities were therefore imported from other lands, and the long bow which every Englishman was obliged to have, of a height equal to his own stature, was formed most commonly of yew. Its toughness and elasticity admirably fitted it for this purpose. Spenser speaks of

The eugh, obedient to the bender's will.

There is much resistance, however, to be overcome in bending a bow made of yew, and the use of the long bow in ancient times must have required an extraordinary degree of strength and skill. It was the proud boast of the yeoman that none but an Englishman could bend that powerful weapon.

The propagation of the tree, which is by seed, has now fallen into neglect; but should the application of its extremely hard and solid wood to the purposes of machinery be added to its present use as an ornamental wood, or should the practice of archery become again universally prevalent, we may expect to see its cultivation better attended to.

Their beauteous veins, the yew
 And phyllerea lend, to surface o'er
 The cabinet.

The wood is at present valued by the cabinet-maker and the inlayer, on account of its beautiful red veins: for works of strength and durability it is also a good material, such as axles, cogs for wheels, flood-gates for fish-ponds, &c.

The specimens of ancient yew-trees are becoming more and more rare. Evelyn speaks of several that

had attained a remarkable size and age. The Crowhurst yew was thirty feet in circumference: a yew in the churchyard of Braburne in Kent was nearly twenty feet in diameter, and Evelyn observes that at Sutton, near Winchester, there was "*such another monster*." An interesting notice of the ancient yew-tree in Dibden churchyard, Hampshire, destroyed by the violent storm in November, 1836, will be found in the *Saturday Magazine*, Vol. X., p. 47, and different opinions respecting the origin of the custom of planting these trees in churchyards are stated in Vol. I., p. 74. Pennant mentions a yew, in a churchyard in the Highlands, which measured fifty-six feet and a half in circumference. In Wales and Ireland twigs of yew-tree are often carried at funerals.



THE COMMON YEW, (*Taxus baccata*.)

BOTANICAL GARDEN AT KEW.

THIS is situated on the south side of Kew Green, having the walls of the royal forcing and kitchen garden, and the pleasure-ground of Kew Palace for its boundaries. It occupies fifteen acres, of which part is devoted to the culture of shrubs and trees: the remainder is taken up with stoves and greenhouses, ten in number, borders of herbaceous plants, open spaces for receiving greenhouse plants in summer, &c. One stove or house, called the Palm Stove, sixty feet long, contains some fine old palm trees among other specimens: a second, forty feet long, has small New Holland and Cape plants in it: a third contains magnificent specimens from New Holland, and other countries: it is 110 feet long, and called the "Botany Bay House." There is a fourth of the same length, said to be the first erected in the garden, which contains noble specimens of succulent and other plants. In general, the plants, especially those from New Holland, are in excellent health, clean, and well attended to; and the general appearance of the collections very creditable.

In the pleasure-ground is a fine old orangery, 130 feet long, filled with orange trees, araucarias, New Holland, and other plants, many of which are of great size. In another part of the ground there has recently been erected an architectural greenhouse, eighty-two feet long, forty-two wide, and twenty-eight high.

This garden has always been maintained as the great botanical garden of the country; yet, under the present defective system pursued in it, it has never been nearly so effective, as a garden of science and instruction, as it might have been rendered.

Visitors are unreservedly admitted to the garden

daily, except on Sundays; a privilege which has, however, as yet afforded no other advantage to the public beyond a pleasant lounge, or at least next to no other. Great quantities of flower and other plants have been supplied from it to the conservatories, &c., of Windsor Castle, and to the royal palaces on birth-days, birth-nights, and other grand entertainments. It was originally formed at the private expense of the royal family, and has, up to the present time, been maintained as part of the household establishments, the estimate of the expenses being regulated and defrayed by the Lord Steward and the Board of Green Cloth. Unconnected, however, as it is with any of the palaces now occupied as royal residences, it has become a mere magazine of materials, valuable only, and very valuable, as a means to stock the other royal gardens.

The cost of repairs, &c., is defrayed at the public expense, out of the revenues of the Commissioners of Woods and Forests; and this cost amounted in 1834 to 981*l.* 6*s.*; in 1835 to 1646*l.* 4*s.* 8*d.*; in 1836 to 5065*l.* 2*s.* 4*d.*; and in 1837 to 449*l.*: making a total in these four years of 8141*l.* 13*s.*

It is proposed that the garden should now be given up for national purposes; there being no botanical institution near London, but a small one at Chelsea, supported by a private corporation, the Society of Apothecaries, who have no funds adequate to maintain such a botanical garden as the wants of science would now seem to demand. The present establishment at Kew would form an admirable foundation, and no better site for it could be found in the vicinity of the metropolis. To make it effective, at least thirty acres from the pleasure-gardens would require to be added, and extensive establishments and arrangements should be made, so as to adapt it perfectly to the three branches of instruction, exhibition, and supply. With respect to the latter, it might be made the great source of new and valuable plants to be introduced and dispersed throughout the country, the centre of authentic and official information upon points connected with the establishment of new colonies, the public nursery for the propagation of plants in our foreign possessions, &c. It is also proposed that the department attached to such a national garden should possess the control over the gardens in the British colonies and dependencies, such as those in Calcutta, Bombay, Saharunpur, the Isle of France, and Trinidad, which cost many thousands a year, and whose utility is much diminished by the want of some system under which they can all be regulated and controlled.

To render such an establishment perfectly effective would certainly not cost more than 20,000*l.*, and 4000*l.* a year afterwards for its maintenance, besides repairs.

[Compiled from an Official Report by Dr. Lindley.]

LEARN from yon orient shell to love thy foe,
And store with pearls the hand that brings thee woe;
Free like yon rock from base vindictive pride,
Imblaze with gems the wrist that rends thy side.
Mark where yon tree rewards the stony shower,
With fruit nectareous, or the balmy flower:
All nature cries aloud,—"Shall man do less
Than heal the smiter, and the railer bless?"

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